RGA

Residual Gas Analyzer

Extrel

www.extrel.com

PRODUCT NOTE

RGA - Residual Gas Analyzer

The Extrel RGA is a reliable, easy-to-use residual gas analyzer that includes full range pressure measurement. An intelligent start-up design allows for the system to know when to switch from the Pirani to the ion gauge and finally to the quadrupole system. The Extrel RGA is a high performing RGA at an affordable price, which makes the system an ideal choice for Background Gas Analysis, Leak Detection and Vacuum Chamber Characterization.

The Extrel RGA is available in two mass ranges, 1 to 100 amu and 1 to 300 amu. The system comes standard with a Faraday detector or an optional dual Faraday/Electron multiplier detector.

RGA Advantages:

- Modular compact design for ease of installation and maintenance
- Full pressure measurement with built-in Pirani and BA gauges
- High measurement speed, stability and resolution
- Minimum detectable partial pressure 5 x 10^{-14} Torr
- 30 minute warm-up time to operation support to multiple heads
- Dual filaments with over-pressure protection
- Programmable electron and ion energy
- Intuitive software with easy-to-use graphic interface
- Choice of computer interface: Serial or USB
- Worldwide on-site and remote support

Overview

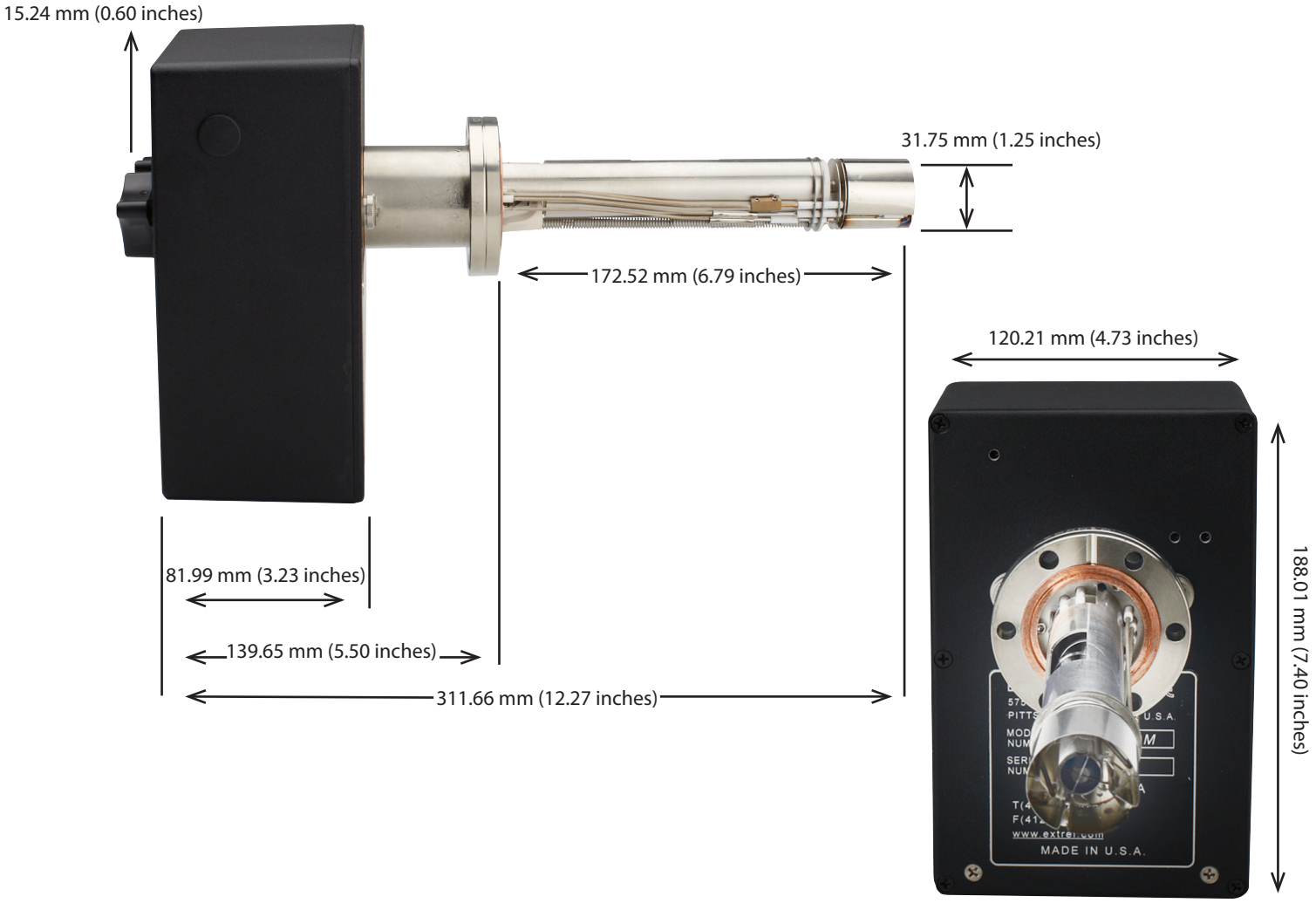
The RGA100 and RGA300 are the ultimate residual gas measurement probes. A single device, mounted on a 2-3/4 inch flange, contains a Pirani gauge, an ion gauge and a quadrupole mass analyzer. All Extrel models start at 1 amu. The RGA100 goes to 100 amu and the RGA300 goes to 300 amu.

Long-Life Dual Filaments and Ion Source Kits

Dual thoria-coated iridium filaments are used for electron emission for both the quadrupole and ion gauge operation. The filaments are protected against stress from vacuum excursions by both the ion and the Pirani functions. Because of these protections, our RGA will outlast filaments in conventional RGA units. When a filament eventually does burn out, the second filament will allow for normal operation until filaments are replaced.

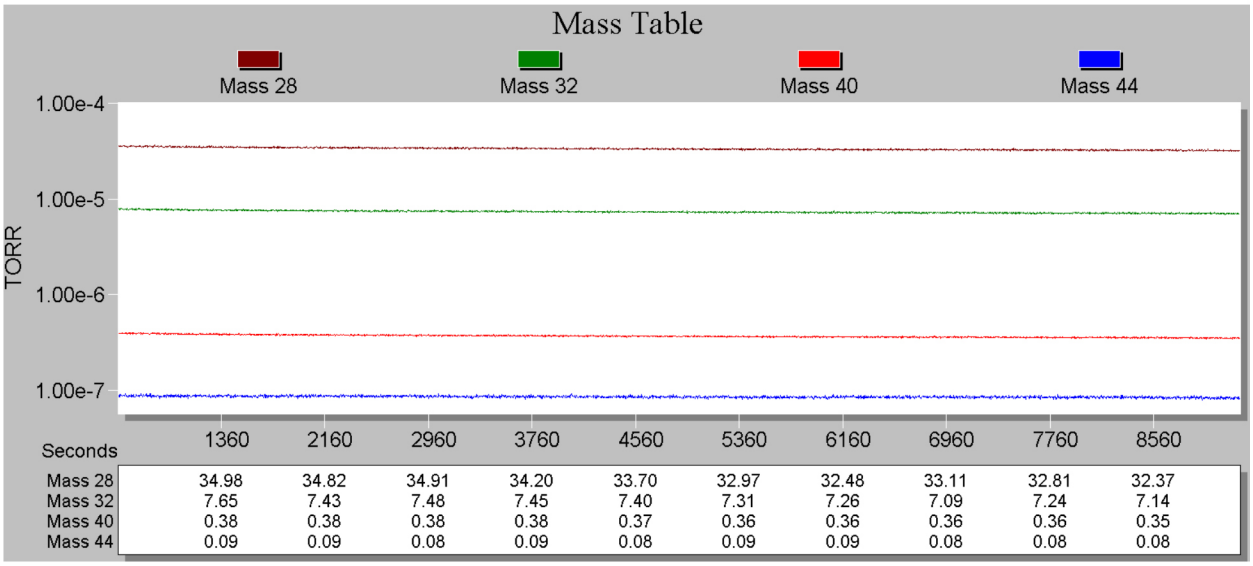
Ultra-Sensitive Detection

The RGA units come standard with a Faraday cup detection system. With the Faraday cup alone, the partial pressure measurement from 10^{-4} and 10^{-11} Torr may be made. With the multiplier option, this sensitivity is extended down to 5 x 10^{-14} Torr. The novel ion current amplifier detects ion currents from 10^{-6} to 10^{-15} amps in a single scan. This huge dynamic range allows for very large and very small peaks to coexist on one scan.



Trend Mode

The peak intensities of up to 10 ions of interest can be followed as a function of time. Peaks to be monitored are set in a Mass Table where mass, description, dwell time for acquisition, color of trace, high and low alarms can be set. The user has full control over how the data is displayed and exported.

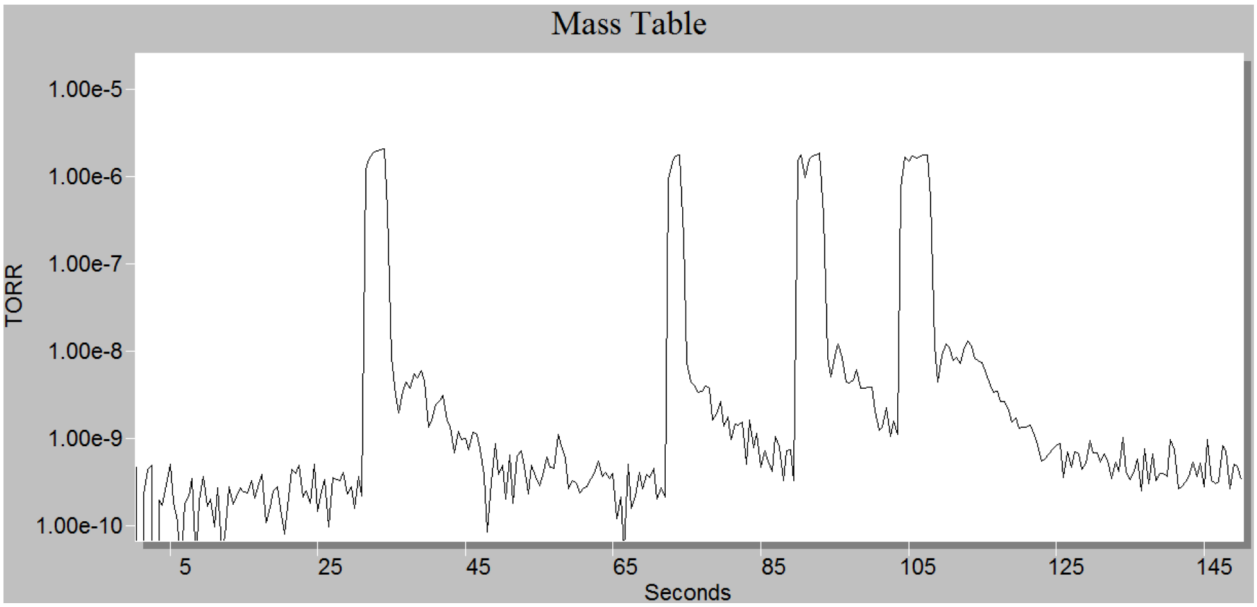


Seconds	1360	2160	2960	3760	4560	5360	6160	6960	7760	8560
Mass 28	34.98	34.82	34.91	34.20	33.70	32.97	32.48	33.11	32.81	32.37
Mass 32	7.65	7.43	7.48	7.45	7.40	7.31	7.26	7.09	7.24	7.14
Mass 40	0.38	0.38	0.38	0.38	0.37	0.36	0.36	0.36	0.36	0.35
Mass 44	0.09	0.09	0.08	0.09	0.08	0.09	0.09	0.08	0.08	0.08

Relative Standard Deviations in terms of normalized concentrations: N_2: 0.27%, O_2: 1.20%, Ar: 1.26%, CO_2: 2.86%

Leak Detection Mode

It is just a matter of placing the gas of choice into the table. The intensity trace of the leak detection peak is then shown on the graph. Leak detection may also be done by sound. An audio signal may be selected which changes the pitch on the computer speakers in proportion to the trace intensity.



Diagnostic Outputs

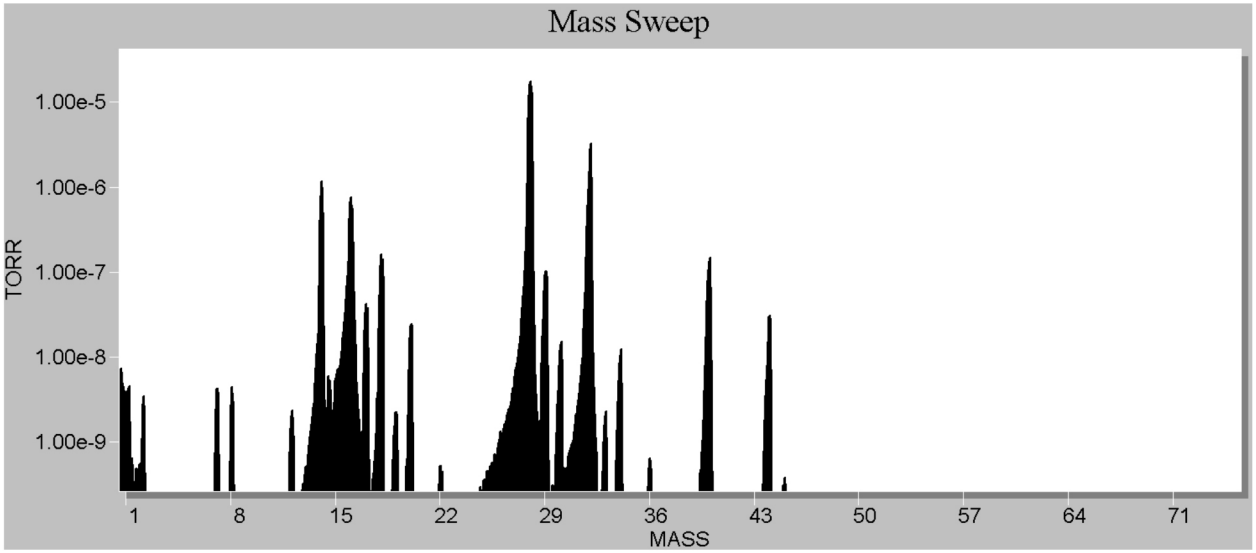
All useful diagnostic information on system operation is available at the click of the mouse. The Outputs page is very extensive, giving real-time measurements of filament voltage, emission current, electronics temperature and much more. This information will quickly detect a filament problem or a shorted probe.

RGA VacuumPlus Software

All Extrel RGA systems come standard with the VacuumPlus Real-Time Windows® software package. An intuitive graphical user interface makes the total functionality of the Extrel system available to the user. Complete pump-down may be monitored quickly and easily. For further analysis, XML data files (text format) can be saved for transfer into spreadsheets, and graphic images can be save or copied into other Windows programs.

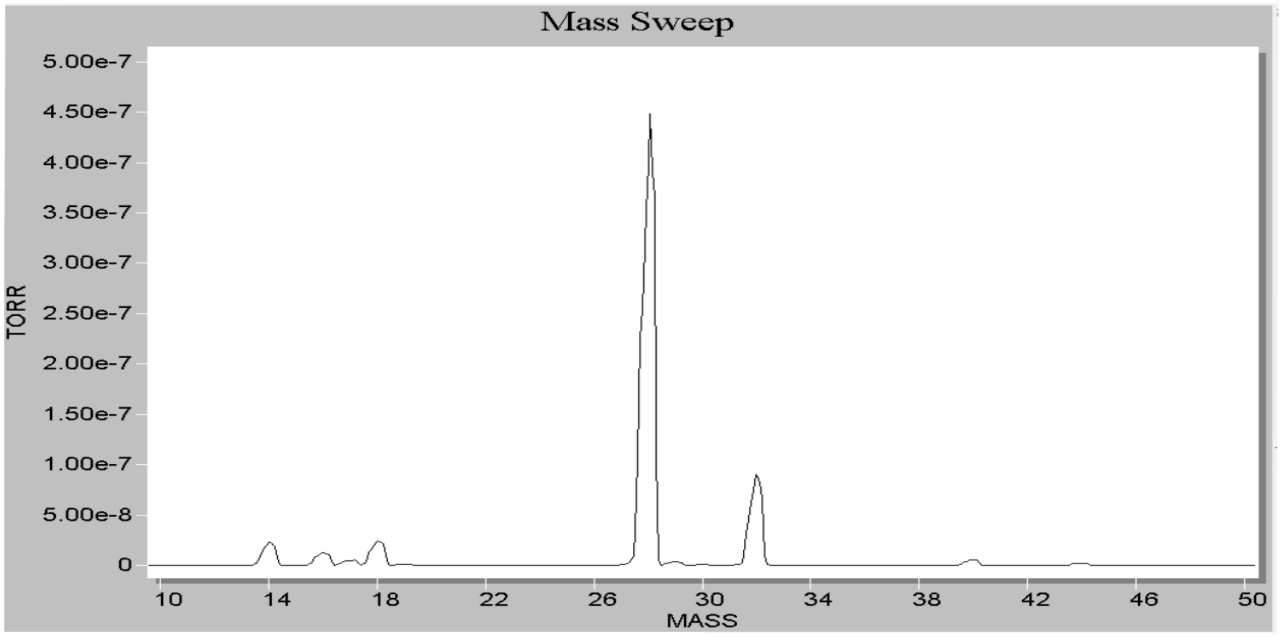
Powerful Operational Modes

The VacuumPlus software comes with the operation modes of Analog Sweep mode, Trend mode, Leak Detect mode and Diagnostic Outputs mode. Choices of analog or logarithmic intensity outputs allow the user to zero in on exactly what they want to see. Scale bars further increase the ability of the user to zoom in on their area of interest. Grid line options allow for more exact numerical determinations of peak heights on graphs. Intensity outputs may be set to Torr, Pascal or Ion current.



Analog Sweep Mode

The fundamental mode of any RGA is the analog sweep mode. The system may be set to take mass spectral intensities from any start mass to any end mass within the mass range of the unit purchased. The user has complete control over the number of data points per amu and the integration time per data point.



RGA Specifications

Mass Range:
- 1 to 100 amu
- 1 to 300 amu

Mass Filter Type: 6 mm Quadrupole

Detector Type:
- Faraday cup only or with Electron Multiplier

Resolution: Better than 0.5 amu (adjustable)

Sensitivity (A/Torr): 5 x 10^{-4} A/Torr

Minimum Detectable Partial Pressure:
- 5 x 10^{-14} Torr w/ Multiplier
- 10^{-11} Torr w/ Faraday

Full Pressure Measurement:
- Pirani Gauge: > 10^{-2} Torr
- BA Gauge: 10^{-2} to 10^{-4} Torr
- RGA: < 10^{-4} Torr

Maximum Operating Temperature: 50°C

Bakeout Temperature: 300°C (without CCU)

Ionizer Design:
- Open ion source, electron impact ionization

Probe Materials:
- SS304, Kovar, Tungsten, Alumina, Iridium, Copper, Nickel

Filament:
- Dual thoria-coated iridium with over-pressure protection, built-in 1 to 30 W degas ramp-up, field replaceable

Electron Energy: 40 to 150 V, programmable

Electron Emission Current: 0.2 to 5 mA, programmable

Probe Dimension:
- 172.52 mm (6.79 inches) from flange face to top of ionizer

CCU Extension:
- 139.65 mm (5.50 inches) from flange face

Minimum Tube I.D.:
- 31.75 mm (1.25 inches) probe mounting

Flange: 69.85 mm (2.75 inches) CF

CCU Dimensions:
- 81.99 mm (3.23 inches) x 120.21 mm (4.73 inches) x 188.01 mm (7.40 inches)
- Easy removal for bakeout

Warm-up Time:
- Mass stability ± 0.1 amu after 30 minutes

Computer Interface:
- RS-232C, up to 115,200 Baud or USB

Software:
- Windows 7 or XP based application

Power Requirements:
- 24 VDC @ 2.5 Amps
- Standard 120 VAC adapter supplied

Weight: 2.27 kg (5.00 pounds)

Support: For over 50 years, Extrel has been committed to providing the highest quality support services for the thousands of instruments installed worldwide. Factory-trained-and-certified personnel offer industry-leading support to Extrel customers at every stage of the environmental monitoring application.

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